CLAIMS

WE CLAIM AS OUR INVENTION:

1. A method of applying a zirconia-based thermal barrier coating, the method comprising:

selecting a composite powder comprising a first constituent comprising zirconia particles and a second constituent comprising particles of a ceramic material having a melting temperature sufficiently low so that the second constituent particles at least partially melt when applied with a low velocity oxygen fuel process; and

using the low velocity oxygen fuel process to apply the composite powder to a surface.

2. The method of claim 1, further comprising selecting the second constituent to comprise particles of calcium titanate.

3. The method of claim 1, further comprising selecting the second constituent to comprise particles of strontium titanate.

4. The method of claim 1, further comprising selecting the second constituent to comprise particles of sodium-zirconium-phosphate-silicate.

5. The method of claim 1, further comprising applying the composite powder to the surface of a component without removing the component from a machine of which it forms a part.

6. The method of claim 1, further comprising selecting the second constituent to comprise at least 20% by volume of the composite powder.

7. The method of claim 6, further comprising selecting the second constituent to comprise from 20-40% by volume of the composite powder.

8. The method of claim 1, further comprising selecting the second constituent to comprise a material exhibiting a coefficient of thermal expansion within 30% of that of the first constituent.

9. The method of claim 1, further comprising selecting the second constituent particles to comprise a material exhibiting a coefficient of thermal expansion within 20% of that of the first constituent particles.

10. The method of claim 1, further comprising selecting the second constituent particles to comprise a material exhibiting a coefficient of thermal expansion within 10% of that of the first constituent particles.

11. The method of claim 1, further comprising selecting the second constituent particles to comprise a material exhibiting a thermal conductivity of no more than 20% higher than that of the first constituent particles.

12. The method of claim 1, further comprising selecting the second constituent particles to comprise a material exhibiting a thermal conductivity of less than that of the first constituent particles.

13. A method of repairing a zirconia-based thermal barrier coating, the method comprising:

selecting a composite powder comprising a first constituent comprising zirconia particles and a second constituent comprising particles of a ceramic material having a melting temperature sufficiently low so that the second constituent particles at least partially melt when applied with a low velocity oxygen fuel process;

providing access to a damaged region of a zirconia-based coating on a component of a machine;

cleaning the damaged region; and

using the low velocity oxygen fuel process to apply the composite powder to the damaged region without removing the component from the machine.

14. The method of claim 13, further comprising selecting the second constituent to comprise particles of calcium titanate.

15. The method of claim 13, further comprising selecting the second constituent to comprise particles of strontium titanate.

16. The method of claim 13, further comprising selecting the second constituent to comprise particles of sodium-zirconium-phosphate-silicate.

17. The method of claim 13, further comprising selecting the second constituent to comprise a material exhibiting a coefficient of thermal expansion within 30% of that of the first constituent.

18. The method of claim 13, further comprising selecting the second constituent particles to comprise a material exhibiting a coefficient of thermal expansion within 20% of that of the first constituent particles.

19. The method of claim 13, further comprising selecting the second constituent particles to comprise a material exhibiting a coefficient of thermal expansion within 10% of that of the first constituent particles.

20. The method of claim 13, further comprising selecting the second constituent particles to comprise a material exhibiting a thermal conductivity of no more than 20% higher than that of the first constituent particles.

21. The method of claim 13, further comprising selecting the second constituent particles to comprise a material exhibiting a thermal conductivity of less than that of the first constituent particles.